

**REMARKS****INTRODUCTION:**

In accordance with the foregoing, the specification has been amended to correct a typographical error, claims 1 and 12 have been amended, and claims 24-27 have been added.

No new matter is being presented, and approval and entry of the foregoing amendments and new claims are respectfully requested.

Claims 1-27 are pending and under consideration. Reconsideration is requested.

**REJECTION UNDER 35 U.S.C. §102:**

In the Office Action at pages 2-3, the Examiner rejects claims 12-16 and 23 under 35 U.S.C. §102 in view of Harkonen et al. (U.S. Patent No. 5,314,759). This rejection is respectfully traversed and reconsideration is requested.

By way of review, claim 12 recites, among other features, “a perovskite structure,” and “samarium (Sm) at least partially replacing an element on one of vertices of the perovskite structure.”

In contrast, Harkonen et al. discloses a phosphor layer 4 in which a host matrix material 7 is layered on a doping layer 8. The doping layer 8 includes an activator 10 and a matching layer 9 disposed between the activator 10 and an adjacent host matrix material 7 as shown in FIG. 3. The matching layer 9 can be  $\text{Al}_2\text{O}_3$ ,  $\text{TiO}_2$ ,  $\text{SiO}_2$ , or materials with a spinel or perovskite structure. The activator 10 can be Mn, Eu, Ce, Sm, Pr, Tb, and Tm. The layers 9, 10 are formed individually using a planar doping concept as described in Example 1 using a planar doping concept such that a layer of Sm is deposited on a layer of  $\text{Al}_2\text{O}_3$ . (Col. 3, lines 38-59, col. 5, lines 5-14 & 26-30, col. 6, lines 23-28). As such, while Harkonen et al. teaches layers Sm on a matching layer 9, there is no suggestion that, assuming arguendo a perovskite structure is used in the matching layer 9, the Sm is included in the perovskite structure or that the process by which the Sm is layered on the matching layer 9 would provide such a result.

As such, it is respectfully submitted that Harkonen et al. does not disclose or suggest the invention recited in claim 12.

Additionally, the Examiner asserts that the recited “wherein an amount of said Sm is such that a luminescence of the phosphor at 1000 hours of usage is at least 40% of an initial luminescence” of claim 12 was not given patentable weight as being a statement of intended use. However, as also noted in MPEP 2114, applicants are allowed to recite structural features in terms of the structural features themselves or in terms of functional interrelationships. It is

respectfully submitted that the recited amount of claim 12 corresponds to a structure of the phosphor expressed in such a functional manner. Moreover, as shown by way of example in FIGs. 2 through 4 of the instant application, the amount of Sm corresponds to the luminescence. As such, it is respectfully submitted that there is evidence of record that the functional feature set forth in claim 12 recites a structure having patentable significance for which the Examiner must account.

For similar reasons, it is respectfully submitted that the features set forth in claims 13-16 should be given patentable weight.

Claim 23 is deemed patentable due at least to its depending from claim 12.

### **REJECTION UNDER 35 U.S.C. §103:**

In the Office Action at pages 3-6, the Examiner rejects claims 1-11 and 17-22 under 35 U.S.C. §103 in view of Toki et al. (U.S. Patent No. 5,619,098) and Harkonen et al. The rejection is respectfully traversed and reconsideration is requested.

The Examiner asserts that Toki et al. discloses the features of claim 1, but acknowledges that Toki et al. does not suggest the use of Sm. In order to cure this deficiency, the Examiner relies upon Harkonen et al. as teaching the use of Sm in a doping layer. However, as similarly noted above in relation to the rejection of claim 12 in view of Harkonen et al., Harkonen et al. teaches a planar doping concept by which Sm is disposed in the activator layer 10 separate from the adjacent matching layer 9. There is no suggestion that the Sm is included in the matching layer 9 or that, if the perovskite structure is in the matching layer 9, the Sm is part of the perovskite structure.

Additionally, Harkonen et al. highlights that the planar doping concept allows for high local concentrations of the activator in comparison with the concentration of the activator actually used in the phosphor layers 4. (Col. 5, lines 51-64 of Harkonen et al.). Since allowing the Sm to be in the matching layer 9 would necessarily reduce the local concentration which Harkonen et al. teaches as being an advantage, Harkonen et al. appears to teach away allowing Sm to be in the matching layer 9.

Since Toki et al. is not does not cure and is not relied upon as curing the above noted deficiency, it is respectfully submitted that the combination of Toki et al. and Harkonen et al. does not disclose or suggest, among other features, “a perovskite structure” and “samarium (Sm) at least partially replacing an element on one of vertices of the perovskite structure” as recited in claim 1.

For similar reasons, it is respectfully submitted that the combination of Toki et al. and

Harkonen et al. does not disclose or suggest the invention recited in claim 17.

Additionally, on page 5 of the Office Action, the Examiner asserts that the functional features of claims 7-11 are not given patentable weight. However, for reasons similarly set forth in relation to the Examiner's assertion that the functional features of claims 12-16 are not given patentable weight and consistent with the guidance set forth in MPEP 2114, it is respectfully submitted that there is evidence of record that the functional feature set forth in claims 7-11 recite structure having patentable significance for which the Examiner must account.

Lastly, on page 5 of the Office Action, the Examiner asserts that since Harkonen et al. discloses using varying amounts of Sm in col. 6, lines 30-35, Harkonen et al. discloses the features of claims 18-20. By way of review, col. 6, lines 30-35 of Harkonen et al. relate a thickness of the activator 10 to a thickness of a matching layer 9 according to an Atomic Layer Epitaxy (ALE) process. However, there is no suggestion as to relative amounts which should be used, or what relative amounts should be used in relation to an element in a perovskite structure. As such, Harkonen et al. does not suggest more than generally using Sm without providing guidance as to amounts to be used.

As can be seen from the examples provided in FIGs. 2 through 4 of the instant application, the amounts of Sm used have an effect which is not suggested in the prior art. Specifically, there are significant differences in the resulting phosphor where no Sm is used (i.e., a concentration of 0.00%) and where amounts of Sm exceed the recited amounts in claims 18-20 (i.e., a concentration of 0.07%). There is no suggestion that such a relationship exists in Harkonen et al. or in Toki et al.

Generally, where evidence exists of record that a recited range imparts a novel feature as compared to the general conditions suggested in the existing art, the rejection cannot be maintained. Specifically and as noted in MPEP 2144.05(III), "[t]he law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.' *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)." Additionally, in making a rejection based on the obviousness of a claimed feature, the Examiner needs to account for evidence in embodiments and experiments set forth in the specification that show the non-obvious nature of the feature. *In Re Glaug*, 62 USPQ2d 1151 (Fed. Cir. 2002).

It is respectfully submitted that there is evidence of record indicating the non-obvious nature of the invention recited in claims 18-20. Therefore, it is respectfully submitted that the

general suggestion to use Sm in an activator layer 10 using a planar doping method does not disclose or suggest the recited amounts set forth in claims 18-20 such that the combination of Harkonen et al. and Toki et al. does not disclose or suggest the invention recited in claims 18-20.

Claims 2-6, 21, and 22 are deemed patentable due at least to their depending from claim 1.

**PATENTABILITY OF NEW CLAIMS:**

Claim 24 is deemed patentable for at least reasons similar to why it is submitted that claim 18 is not disclosed or suggested in the prior art. Claims 25-27 are deemed patentable due at least to their depending from claim 24.

**CONCLUSION:**

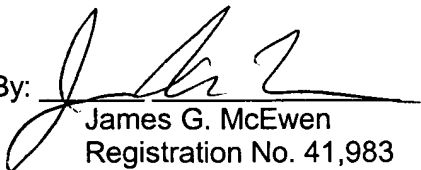
In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot. And further, it is respectfully submitted that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any additional fees associated with the filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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